



## Original communication

## Fatal intimate partner violence against women in Portugal: A forensic medical national study



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## ABSTRACT

Intimate partner violence (IPV) is an important cause of women's health and socio-familial severe problems, the most extreme being the victims' homicide. This is the first nationwide Portuguese autopsy-based and judicial-proven study about female intimate partner homicide.

At least 62 women over 15 years old were killed by current or former men-intimate partners, corresponding to an IPV-related female mortality rate of 0.44/100.000 women; intimate partner violence was the reason of homicide in 60.8% of all autopsied women.

The typical Portuguese victim showed to be a young adult woman, employed, killed by a current husband in a long-term relationship, usually with children in common and with a history of previous IPV. The typical Portuguese perpetrator showed to be older than the victim, employed, owning a firearm and without criminal records. At the time of the fatal event 59.7% of the relationships were current. In 57.9% of the former relationships women were killed during the 1st year after its terminus. Near half of the perpetrators attempted or committed suicide afterward. Most women were killed by gunshot wounds (45.2%), especially in the thorax (48.4%), with multiple fatal injuries; 56.5% also presented non-fatal injuries.

The detection of prior IPV and the risk evaluation seems to be fundamental to decrease these fatal outcomes, but also, the prevention of perpetrators' alcohol abuse and carrying weapons. This work emphasizes the need to deepen the research on this issue, aiming to contribute to prevent both fatal and non-fatal IPV-related cases.

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## 1. Introduction

Violence against women is a widely spread phenomenon that still persists in current societies and most of the time, it occurs within the family context (domestic violence – DV). More specifically, intimate partner violence (IPV), which happens within an abusive intimate relationship, is considered a global phenomenon with significant economic and socio-familial impact, with particularly serious effects on victims' physical and mental health, the most extreme being the victims' homicide.<sup>1–3</sup>

According to the *World Health Organization*,<sup>1,2</sup> the reality of women killed by an intimate partner is progressively becoming

more evident on a worldwide scale, mainly because of relevant incidence and mortality rates, accounting for up to 70% worldwide and 35% in Europe, among all female homicide victims. Even though western studies show that absolute rates of intimate partner homicides have been roughly stable over time,<sup>4–6</sup> it is expected that a higher proportion of fatal IPV is found in countries where there is a low intentional homicide rate, as it is the case of Portugal.<sup>4,7–9</sup>

Considered as a priority in the political setting, many policies have been defined to prevent IPV. In the Portuguese context, we can identify, among others, the revision of the Portuguese Criminal Code in 2007 (finally considering the crime of DV as an autonomous and typified crime), the implementation of *National Plans against Domestic Violence* (since 1999), as well as the publication of specific laws to support the victims, including the Law 112/2009 of 16th September referring, among others, to the victim's statute.<sup>3,10</sup>

According to the Portuguese Penal Code, the crimes that could be considered in fatal IPV include, among others: *murder* defined as

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an intentional homicide which is punishable with a prison sentence ranging from 8 until 16 years; or *qualified murder* which is additionally provoked under particularly censurable or malicious circumstances (namely, when the victim is an intimate partner of the perpetrator) and evolving a higher punishment no longer than 25 years.

Fatal IPV can better be understood as an extension of the IPV phenomenon than within the scope of general homicide.<sup>11</sup> Its risk factors result from a combination of risk factors for homicide in general and specific characteristics of intimate relationships.<sup>12</sup> This knowledge of risk assessment is essential to identify women at high risk for IPV lethality and thus intervene, namely with protective measures.<sup>12,13</sup> However, despite the magnitude of the problem, non-fatal IPV is far more studied than fatal IPV, and as a consequence there is lack of data on this specific type of mortality,<sup>4,11</sup> which makes it a priority in scientific research.<sup>1</sup>

The aim of the study is to contribute to a better understanding on fatal IPV against women, perpetrated by male-intimate partners in Portugal, from a forensic medical perspective, with calculation of mortality rates and prevalence, and describing socio-demographic, clinical, forensic and criminology characteristics of homicide victims and perpetrators.

## 2. Material and methods

As forensic structures have excellent resources which allow an accurate selection of fatal IPV cases,<sup>14</sup> the departments of forensic pathology of the *National Institute of Legal Medicine and Forensic Sciences* (INMLCF) in Portugal were the starting point for this research. Therefore, all records (autopsy reports plus medical, police and social-related records) regarding alleged IPV-related homicides of women over 15 years-old, from the period from January 2005 to December 2007, were reviewed ( $n = 70$ ) – primary data source.

For this sample selection, IPV was considered as all forms of violence between the victim and alleged opposite-sex perpetrator within a current or past intimate relationship and categorized into: marital relationships (involving marriage and cohabitation); common-law relationships (involving civil union and cohabitation); dating (girlfriends and boyfriends without regular cohabitation); extramarital relationship (relation outside of a committed relationship without cohabitation or regular one). The cases were selected only until 2007 to make sure that the criminal investigation and judicial decisions were already available for analysis.

After obtaining all the correspondingly judicial decisions – second data source – which were sent by the Public Prosecutors Offices and Courts, the totality of cases were classified into 2 groups, according to the judicial decision: (a) *proved IPV-related homicide* (involving an intimate relationship) –  $n = 62$ ; and (b) *unproved IPV-related homicide* (unproved intimate relationship or lack of sufficient evidence) –  $n = 8$ .

All *proved IPV-related homicide* ( $n = 62$ ) were retained and reviewed in a more detailed way, while data was always collected by the same investigator and applied in a digital database (*Excel 2007 – Microsoft®*). A statistical study using descriptive measures was performed with software *R*, version 2.14.0.

## 3. Results

During a 3-year period, 102 women were autopsied due to alleged homicide in the forensic national services of Portugal (INMLCF). Of these, 62 were judicially-proved to have being killed in the setting of an IPV relationship (60.8%). These cases correspond to a mean mortality rate of 0.44/100.000 women aged 15 years or older, per year.

### 3.1. Characterization of the victims and perpetrators

The mean age of victims was 43.8 years old (min. = 17, max. = 82, SD = 17.3) although almost 50% aged 20 to 40. Perpetrators were 49.3 years old on average (min. = 20, max. = 78, SD = 15.7) and the most frequent age group was 40–50 years old. At the time of the death, most women (38.7%) were not working (housewife, unemployed or retired); most men were actively working (33.9%), whilst 25.8% of the men did not (Table 1).

Most of the victims were born in Portugal whereas 11.3% ( $n = 7$ ) were immigrants. All women were living in Portugal, except one Portuguese emigrant killed while on vacations in Portugal.

Even though the paucity of information (between 79% and 82.3%), a history of substance abuse (alcohol and/or drugs) in 6.5% and 17.7%, and a psychiatric history in 9.7% and 16.1% of the victims and the perpetrators, respectively, was confirmed.

In the cases where information was available ( $n = 31$ ), in 93.5% ( $n = 29$ ) the men owned a firearm (with legal or illegal possession). Also, information about perpetrators' criminal history was known in only 37 cases and of those, 29.7% ( $n = 11$ ) presented criminal records or previous convictions including: drug-related crimes ( $n = 1$ ), sexual-related crimes ( $n = 1$ ), and domestic violence crimes against a son ( $n = 1$ ) and an intimate partner ( $n = 1$ ).

### 3.2. Characterization of the intimate relationships

At the time of the fatal event, 59.7% of the relationships were current and half of the victims ( $n = 31$ ) were cohabitating with the perpetrator. The proportion of perpetrators who were current intimate partners was higher than former partners for all types of relationships, except for dating. Excluding extramarital relationships, Portuguese women were mostly killed by their marital partners (60.7%), rather than by non-marital partners (39.3%), including common-law and dating partners. The average length of the relationship was 15.7 years (SD = 14.9): 21 years for current ones (SD = 15.7); 8.7 years for former ones (SD = 10.4). The proportion of short-term relationships was higher for former relationships, with more than half of them lasting 5 years or less. The length of separation until the fatal event was 19.5 months on average (SD = 34.5) and in 2 outlier cases the elapsed time was nearly 8 and 10 years. From the known cases ( $n = 19$ ), in 57.9% of the former relationships, women were killed in the first year after its *terminus* (Table 2).

The victim and the perpetrator had offspring in 53.2% of the cases ( $n = 33$ ), but this information is unknown in 5. Regardless of the number of cases ( $n = 25$ ) in which this information was

**Table 1**  
Characteristics of the victims and perpetrators.

		Victims	Perpetrators
		<i>n</i> (%)	<i>n</i> (%)
Age (years old)	[17,20]	2 (3.2)	0 (0.0)
	[20,30]	14 (22.6)	7 (11.3)
	[30,40]	15 (24.2)	12 (19.4)
	[40,50]	11 (17.7)	16 (25.8)
	[50,60]	10 (16.1)	8 (12.9)
	[60,70]	4 (6.5)	8 (12.9)
	[70,80]	4 (6.5)	8 (12.9)
	[80,82]	2 (3.2)	0 (0.0)
	Unknown	0 (0.0)	3 (4.8)
Employment status	Employed	22 (35.5)	21 (33.9)
	Housewife	14 (22.6)	0 (0.0)
	Retired	9 (14.5)	9 (14.5)
	Student	4 (6.5)	2 (3.2)
	Unemployed	1 (1.6)	7 (11.3)
	Unknown	12 (19.4)	23 (37.1)

**Table 2**  
Characteristics of the intimate relationships.

		Total (n = 62)	Current (n = 37)	Former (n = 25)
		n (%)	n (%)	n (%)
Nature	Marital	34 (54.8)	23 (62.2)	11 (44.0)
	Common-law	15 (24.2)	8 (21.6)	7 (28.0)
	Dating	7 (11.3)	1 (2.7)	6 (24.0)
	Extramarital	6 (9.7)	5 (13.5)	1 (4.0)
Length of relationship (years)	[0,10]	22 (35.5)	9 (24.3)	13 (52.0) <sup>a</sup>
	[10,20]	9 (14.5)	5 (13.5)	4 (16.0)
	[20,30]	7 (11.3)	5 (13.5)	2 (8.0)
	[30,40]	3 (4.8)	2 (5.4)	1 (4.0)
	[40,50]	4 (6.5)	4 (10.8)	0 (0.0)
	[50,60]	1 (2.16)	1 (2.7)	0 (0.0)
Length of separation	Unknown	16 (25.8)	11 (29.7)	5 (20.0)
	0–1 year	–	–	11 (44.0)
	>1 year	–	–	8 (32.0)
	Unknown	–	–	6 (24.0)

<sup>a</sup> All these relationships lasted 5 years or less.

unknown, most victims had a history of prior IPV perpetrated by the same man who killed them ( $n = 29$ , 46.8%); but only in 3 cases it was possible to ascertain that, before their death, women had been previously examined at the clinical forensic medicine departments of the INMLCF by pressing IPV-charges against their partners.

### 3.3. Characterization of the circumstances surrounding the death

During the 3-year study period, the cases, per year, were: 23, 23 and 16, respectively. More than two thirds of the incidents ( $n = 43$ ) occurred during spring (32.3%) and summer months (37.1%). Almost half of the deaths ( $n = 30$ ) occurred over the weekend period.

From the known cases ( $n = 54$ ), in 38.9% ( $n = 21$ ) the crime was triggered in a context of separation of the couple, including threats, attempts or consummated separations. Of these, 5 cases corresponded to current relationships where the victims tried to end the bond but were killed before accomplishing it. In the remaining 16 former relationships cases, victims had just separated from their intimate partners, who did not accept the fact. An important alleged motive for the crime was related to jealousy (31.5%,  $n = 17$ ), including cases where the perpetrator suspected of the existence of a new intimate partner of the victim; in some of them, men's statements were found such as "If I can't have you, nobody can", "The day you leave me, I will kill you" or "If you are not mine you won't be anyone else's either". Among other alleged motives, 22.2% ( $n = 12$ ) were related to conflicts, as marital, familiar, parental and/or financial. In one particular case, compassion was the motive of the *mercy killing* of a 79 year-old woman, who was bedridden and suffering from a painful disease; she was killed with a dagger by her husband, a retired army captain, who afterward slashed his own wrists.

Excluding 2 unknown cases, most events occurred in private residences (61.7%,  $n = 37$ ), usually in homes shared by the victim and perpetrator, while 35% ( $n = 21$ ) occurred in public places, including 1 case that happened in the victim's workplace.

Regarding perpetrator's suicidal behaviors, considered within 1 week after committing homicide,<sup>15–17</sup> 24.2% ( $n = 15$ ) consummated this act while 22.6% ( $n = 14$ ) just attempted to take their life.

In 5 cases (8%), 6 homicides' witnesses were killed apart from the female victim (including 2 sons and 1 ex-stepson) and in 2 cases other persons were seriously injured. In 13 cases (21%) the homicide was perpetrated in front of a minor, child or stepchild.

### 3.4. Forensic autopsy findings

Characteristics of fatal and non-fatal IPV-related injuries were summarized in Table 3.

**Table 3**  
Fatal and non-fatal IPV-related injuries according to type of method, anatomical location and number of injuries.

		Fatal (n = 62)	Non-fatal (n = 35)
		n (%)	n (%)
Method	Gunshot trauma	28 (45.2)	0 (0.0)
	Sharp/chop trauma	17 (27.4)	13 <sup>a</sup> (37.1)
	Blunt trauma	9 (14.5)	22 <sup>a</sup> (62.9)
	Heat trauma with burns	2 (3.2)	0 (0.0)
	Manual strangulation	3 (4.8)	0 (0.0)
	Multiple methods	3 (4.8)	0 (0.0)
Location <sup>a</sup>	Head	25 (40.3)	10 (28.6)
	Face	13 (21.0)	16 (44.7)
	Neck	19 (30.6)	15 (42.9)
	Thorax	30 (48.4)	17 (48.6)
	Abdomen	10 (16.1)	10 (28.6)
	Upper limbs	2 (3.2)	26 (74.3)
Number	Lower limbs	2 (3.2)	6 (17.1)
	1	28 (45.1)	2 (5.7)
	2–9	26 (41.9)	22 (62.9)
	≥10	8 (12.9)	11 (31.4)

<sup>a</sup> Categories are not mutually exclusive (not adding up to  $n = 62$ ,  $n = 35$  or 100%).

Fatal injuries, in order of frequency, were due, among others, to: (a) gunshot trauma (45.2%), involving mainly shotguns ( $n = 15$ ) but also, rifles ( $n = 2$ ) and handguns ( $n = 11$ ); (b) sharp and chop trauma (27.4%), including knives/razors/daggers ( $n = 15$ ) and axes ( $n = 2$ ); (c) blunt trauma (14.5%), implicating objects ( $n = 5$ ) or bodily force ( $n = 4$ ). Three cases involved a combination of methods: (a) gunshot associated to blunt trauma; (b) bodily force and manual strangulation; and (c) ligature strangulation (rope) associated to suffocation (pillow). The most frequent area wounded by fatal trauma was the thorax (48.4%), followed by the head, neck and face. More than half of the victims (54.8%) suffered fatal multiple wounds.

In 56.5% of the cases ( $n = 35$ ) victims presented additional non-fatal IPV injuries, which were produced by blunt force (62.9%) or sharp force (37.1%), in 94.3% with multiple injuries and mainly located in the upper limbs and thorax; of these victims, 30.6% presented defense injuries ( $n = 19$ ) related to the fatal incident, mostly in the upper limbs. Only 1 woman (1.6%) presented injuries in the healing stage (non-recent bruises in the left arm), suggestive of prior IPV. Also, none of the cases presented injuries suggesting sexual abuse.

Ancillary exams were performed in some cases, such as: (a) X-ray (11.3%,  $n = 7$ ); (b) toxicological analysis, which revealed positive results for blood alcohol concentration (16.7%,  $n = 8/48$ ), illegal drugs (6.5%;  $n = 2/31$ ), and prescription medication (31%;  $n = 9/29$ ); (c) DNA analysis (35.5%,  $n = 22$ ): in 16 cases (72.7%) samples were collected underneath the fingernails of the victims, with 4 positive results; in 9 cases (14.5%), even in the absence of suggestive injuries, sexual abuse, contemporaneous to the fatal incident, was suspected and anogenital samples were collected, all with negative results; (d) ballistics analysis (including analysis of gunshot residue, ammunitions and/or firearm).

### 3.5. Legal case progression and judicial outcomes

From the total of *proved IPV-related homicides*, 72.6% ( $n = 45$ ) were prosecuted while 27.4% ( $n = 17$ ) were filed by the Public Prosecutor Office due to the death of the defendant before the trial. Among the prosecuted cases, 93.3% were convicted ( $n = 42$ ), including 95.2% with prison sentence and 4.8% to security measures by reason of insanity (among 14 cases who had been subjected to a forensic psychiatric evaluation during the trial). The remaining ( $n = 3$ ) were filed because the defendant died during protective custody before being convicted (Fig. 1).

The majority ( $n = 42$ ) of the cases were considered: *qualified murder* (59.6%,  $n = 15$ ) or *murder* (38.1%,  $n = 16$ ); in only 1 case the practice was considered a crime of offenses against the physical integrity, aggravated by the result. In 42.9% ( $n = 18$ ) there were also convictions by other associated crimes. Regarding the 40 cases with prison sentence – average 15.5 years (min. = 8, max. = 23.3, SD = 3.6) – 85% of the perpetrators ( $n = 34$ ) were sentenced between 10 and 20 years in prison, including 30% ( $n = 12$ ) between 16 and 18 years.

#### 4. Discussion

This is the first nationwide study, autopsy-based and judicial-proven, concerning female intimate partner homicide victims. Despite the representative population – 20.7 victims on average detected per annum – this investigation does not allow us to reach conclusions about trends; time-series data from other countries reveal only a slight fluctuation over time.<sup>4–6</sup>

Comparatively, the Portuguese IPV-related female homicide rate (0.44/100.000 women aged 15 years or older, per year) is far below the ones of the USA (3.46/100.000 women)<sup>18</sup> or South Africa (8.8/100.000 women)<sup>11</sup> but these numbers must necessarily be considered according to the intentional homicide's rates per 100.000 inhabitants of each country (1.2/100.000 inhabitants, 5/100.000 inhabitants and 33.8/100.000 inhabitants, respectively)<sup>4</sup> (Table 4).

Moreover, mortality rates from other countries are not fully comparable because they are reported with different based-methodologies.<sup>6,9,11,17,19</sup> Finally, even though the total number of deaths disclosed through this study, are all confirmed cases, it should be considered as an underestimated number since we admit that there can still be others, which were not included as: some few cases may have escaped the mandatory forensic autopsy (done in all suspected violent deaths); other cases may have been filed due to lack of evidence (which does not exclude that these cases could be true IPV-related female homicides, but just, that they were excluded from this study for the given methodological reasons).

**Table 4**

Comparison of intentional homicide rates and IPV-related female homicide rates.

Country	IPV-related mortality rate <sup>a</sup>	Intentional homicide rate <sup>b</sup>
<b>Portugal (present study)</b>	<b>0.44</b>	<b>1.2</b>
South Africa <sup>11</sup>	8.8	33.8
USA <sup>18</sup>	3.46	5.0

<sup>a</sup> Rates per 100.000 women 15 years old or older (except for South Africa, 14 years old or older).

<sup>b</sup> Rates per 100.000 inhabitants; data obtained from Global Study on Homicide: trends, contexts and data (UNODC)<sup>4</sup>.

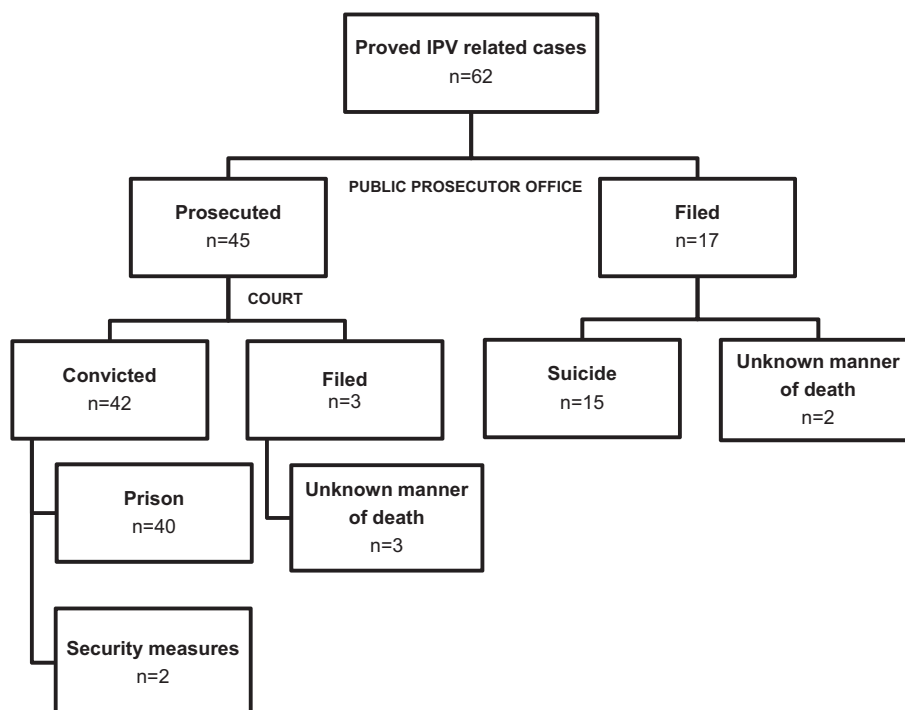
Nevertheless, female intimate partner homicide victims constitutes a relevant proportion (13.3%) of the alleged homicide autopsies' case load, representing the most common type of women's homicide (60.8%), as expected in a low intentional homicide rate country as ours.<sup>4</sup> The results are, globally, in accordance with other data that show that between 33 and 70% of female murder victims are related to IPV<sup>2,4,5,9,11,14,18–24</sup> (Table 5).

Forensic medical data have excellent resources for identifying alleged victims of fatal and non-fatal injuries intentionally inflicted, because even the cases not pursued by the criminal justice system may be included.<sup>14</sup> Therefore, one of the strengths of the present study is the adopted methodology – cases were selected through the forensic system (selecting the suspected cases) and afterward confirmed by judicial outcomes (selecting only the proved cases) – which, in spite of all limitations, we believe that it is by far one of the most reliable methods by which these cases can be identified and characterized in the current Portuguese context.

##### 4.1. Victims and perpetrators

Our retrospective study did not allow a full exhaustive characterization of the victims and perpetrators because much information was not documented, especially concerning perpetrators.

Young adult victims were the most common (Table 1), which may suggest that younger women are at greater risk, a fact that is supported by previous research.<sup>9,11,18</sup> We also found that most



**Fig. 1.** Legal case progression and judicial outcomes.



**Table 5**

Comparison on prevalence of IPV-related homicides of women among all alleged general homicides and all alleged homicides of women.

Country	IPV-related homicides/ general homicides (%)	IPV-related homicides/ homicides of women (%)
<b>Portugal (present study)</b>	<b>13</b>	<b>61</b>
Northern Europe <sup>9</sup>		45
England and Wales <sup>22,23</sup>	15	37–52
Spain <sup>19</sup>		63
USA <sup>18,20,21</sup>	11	33–50
Canada <sup>5</sup>	15	50
South Africa <sup>11</sup>		50
Dominican Republic <sup>14</sup>		70
Australia <sup>24</sup>		53

perpetrators were aged 30–50 years old (Table 1), which is also similar to literature.<sup>9</sup> On average, perpetrators were 5.5 years older than the corresponding victims, which shows a trend that is in accordance with different studies which refer that there is higher risk of IPV homicide for age discrepant couples.<sup>25</sup>

A relevant number of victims (11.3%) were immigrants, compared to the 3.7% of foreign population living in Portugal in 2011, which constitute a risk factor for IPV and IPV-related homicide.<sup>26</sup> Most women were not working (Table 1), which is similar to results from a Scandinavian study that showed that a higher proportion of the victims were not employed.<sup>9</sup> Near 25.8% of the perpetrators were not working at the time of the homicide which is considered a risk factor for both fatal and non-fatal IPV.<sup>4,12</sup>

A certain number of victims had a history of chronic alcohol and/or illegal drug abuse (6.5%) and had consumed before the homicide: 16.7% and 6.5%, respectively, presented positive blood alcohol and illegal drugs concentration, which is far below the rates referred in other studies<sup>9,18,27</sup> but also compared to the prevalence of lifetime alcohol abuse considering the Portuguese population (79.1%); as well as it may be considered a risk factor, as it has been previously reported, especially for alcohol.<sup>4,9,12,27–29</sup> Many studies show that alcohol abuse of the perpetrators (at least 17.7% presented a history of alcohol and/or drug abuse, in our study) is associated with a twofold increased risk of attempted or consummated female homicide while men with some personality disorders (in our study, at least 16.1% had history of psychiatric disorders while the prevalence in Portugal is 23%) are more likely to perpetrate an intimate homicide.<sup>30</sup> Both aspects considered high-risk factors for fatal IPV.<sup>4,9,12,27,28,31</sup>

At least, 29.7% of the perpetrators presented criminal records but only 4 cases had records of violence or drug-related crime, including one due to IPV. According to literature, previous arrest for DV is considered to be protective against fatal IPV<sup>12</sup> but, also, previous arrest/conviction for any type of crime has been found to constitute a risk factor for future offenses, including IPV.<sup>32</sup>

#### 4.2. The intimate relationship and the circumstances of the death

Women were mostly killed by their marital partners (60.7%) (Table 2) while, published data, contrarily, show that in comparison to marital partners there is a stronger likelihood of non-marital partners committing homicide (54–73%),<sup>11,18,33–35</sup> and also, homicide rates in current common-law relationships are nearly 8 times higher than the rate in current marital relationships.<sup>33</sup> These worldwide trends may be explained by demographic shifts, marriage/cohabitation tendencies and changing relational lifestyles across the population. At the time of the event, most victims were in current relationships and were living with the perpetrator (Table 2). According to Campbell,<sup>12</sup> situations in which the intimate partners had never lived together (21% in the present study) were protective and, in fact, globally, the lowest share of intimate

homicides are related to dating relationships (11.3% in our study and 19–28% in foreign studies).<sup>6,11,12</sup> The proportion of short-term relationships was higher in former relationships (average length 8.7 years versus 21 years in current relationships) and according to a Chicago study, the length of the couple's relationship influences the risk of intimate partner homicide.<sup>28</sup> Another study demonstrated that longer marriage duration and marital partners who confessed having had an extramarital relationship were both associated with higher risk of recent IPV.<sup>36</sup> Also, some researchers argued that childlessness is associated with higher risk of physical and sexual abuse,<sup>36</sup> but this result is not in accordance with ours, where most couples had offspring.

Almost 46.8% of the analyzed victims presented a history of prior IPV perpetrated by the killer partner, similar to what happens in other countries: 59% in Australia<sup>34</sup> and even more in USA, near 67%,<sup>18</sup> which is considered a primary risk factor, functioning as a precursor to female partner homicide.<sup>2,4,11,12,17,18,22,34</sup> Also, compared to cases of homicide without a history of IPV, it was found that perpetrators were more likely to be former partners, to have criminal records, to have consumed alcohol and less likely to have attempted suicide afterward.<sup>18</sup> Only a single victim had physical healing injuries suggestive of non-recent IPV, found during the forensic autopsy, but this does not exclude the fact that other women had also been victims of previous IPV, which is understandable because, generally, diagnostic signs of physical or sexual violence related with intimate relationships are difficult to establish and frequently this kind of violence do not leave physical sequelae.<sup>37</sup> Additionally, in only 3 cases it was possible to check that women had pressed previously IPV-charges and had been examined at the clinical forensic, while data from USA shows that nearly 37% of victims contacted law enforcement for IPV-related incidents during the year before death.<sup>18</sup> This finding shows the importance of reporting suspected IPV cases and also indicate that is fundamental to seriously evaluate the risk in these situations.<sup>13</sup> Unfortunately, unreported cases represent the majority, not only in Portugal but also in other countries, because victims do not disclose and health professionals do not report it.<sup>1</sup> Nowadays, links between deaths and prior comparable violence cannot be easily made,<sup>14</sup> so, considering this aspect, it is crucial to develop additional studies based on IPV death reviews.

Most fatal events occurred during summer months and during the weekend, which is totally in accordance with recent studies from northern and southern hemispheres concerning homicide peaks.<sup>19,38,39</sup> This may be related to social, psychological and biological factors including seasonal and circadian cycles of violent deaths but, also, to longer periods of time socializing and higher alcohol and drug consumptions during the weekend.<sup>38</sup>

Concerning the homicide's motivation, our results show that separation (threats, attempts or consummation) was the most frequent alleged reason (38.9%), which is similar to previous studies, namely, 38% in a Chicago study.<sup>28</sup> The fact that a woman is leaving, attempting or suggesting to leave a relationship is considered by several researchers to be a high-risk factor for the lethal IPV.<sup>4,12,24,28</sup> In a relevant number of cases, the victim was within a former relationship (40.3%) (Table 2), which is slightly higher than the one found in other studies (32% in USA and 37% in Australia),<sup>18,34</sup> meaning that a high risk persists even after the couple's separation. Also, most women were killed by ex-partners within a year of separation (57.9%) (Table 2) while others studies showed shorter length of separation: 47% were killed within 2 months of separation and 91% within a year<sup>40</sup>; 52% had a time period of less than one month.<sup>41</sup> Furthermore, the second most common homicide motive was jealousy (31.5% comparing to 36% in Denmark)<sup>9</sup>; some researchers argue that a large majority of intimate homicides against women are precipitated by jealousy (in

particular morbid jealousy).<sup>42</sup> A very similar case to the *mercy-killing* case described was also reported in Denmark.<sup>9</sup>

The majority of victims were killed in private residences, usually their own homes, as in earlier studies.<sup>9,18</sup>

Comparing international data on female homicides, we conclude that the prevalence of actual suicide after homicide is similar and fairly high on studies from different countries: 24.2% in the present study, 19% in South Africa,<sup>17</sup> 23% in USA<sup>18</sup> and 25% in Denmark<sup>9</sup>; this is not the case in attempted suicide where our rate (22.6%) is relatively high comparing with others: 7% in Canada<sup>42</sup> and 3% in the USA.<sup>18</sup> Even though we did not have data to reach the same conclusions, Campbell<sup>15</sup> stated that the unique risk factors for femicide-suicides (compared to overall femicide) were: prior perpetrator suicide threats and victims having been married to perpetrator. Also, it is known that homicide-suicide is more common in countries with low homicide rates<sup>4,7,8</sup> and in the context of intimate relationships,<sup>7–9</sup> accounting for 65% of all murder-suicide with female victims.<sup>8</sup> Also, comparing our results with a regional Portuguese study on general homicides we conclude that homicide-suicide events are much more frequent in IPV homicides (24.2%) than in general homicides (9%).<sup>43</sup>

Multiple victims are not frequent in intimate partner homicides: 8.1% in our study, 10% in a Milan study<sup>8</sup> and 5% in a Chicago study.<sup>28</sup> Children are reported to be the second most common victims in homicide-suicide events<sup>8</sup>; in the present study, 21% of the cases occurred within the presence of minors (children or stepchildren), who witnessed the fatal event. It is well demonstrated that minors witnessing IPV constitutes a very severe type of child abuse and also a risk factor for future potential victims or perpetrators of IPV.<sup>35</sup> The presence of stepchildren of the perpetrator cohabiting with the couple is considered a risk factor for intimate partner homicide.<sup>12,28</sup>

#### 4.3. Forensic autopsy findings

In the present study, most of the victims were killed by gunshot trauma (45.2%) followed by sharp trauma and blunt trauma (Table 3). As indicated by previous research, the perpetrator's availability and access to firearms is a major risk factor for fatal IPV against women (an 8-fold increase),<sup>4,6,11,12,17,28</sup> so it is not surprising that in our study all perpetrators who owned firearms used them to kill their partners, even though the prohibition of firearm license is indeed covered, since 2007, in our Portuguese Penal Code as an additional penalty in domestic violence crimes, including IPV cases. The accessibility to some specific firearms may be explained by the fact that sport hunting is regularly practiced in Portugal,<sup>44</sup> explaining why shotguns and rifles were used in 60.7% of all deaths by gunshot trauma. Comparing the prevalence of firearms use between general homicides in Portugal – 34% in a Global Study on Homicide from United Nations,<sup>4</sup> and 50.6% in a Portuguese study on Homicides in the north of Portugal<sup>43</sup> – and IPV homicides of women in Portugal (45.2% in the present study) we may admit that gun ownership is linked to general homicides but also IPV ones. Another aspect is that handguns are more used in general homicides (60.1%)<sup>43</sup> while shotguns and rifles are more used on IPV homicides of women (60.7%), as the result of the present study.

Reports from different countries show dissimilar percentages of general homicides involving a firearm<sup>4</sup> and different commonest methods of IPV-related homicide of women.<sup>9,11,18,19,23,45</sup> Concerning the more frequent method of female intimate partner homicide, we realize that the most similar countries to Portugal are USA and Canada, all with gunshot trauma as the most common one (45%, 66% and 40%, respectively).<sup>18,45</sup> Other countries where shares of general homicides involving a firearm were more or less the same as the ones reported to Portugal,<sup>4</sup> women were mainly killed by

other methods apart from gunshot wounds, such as, South Africa (33% blunt trauma),<sup>11</sup> Denmark (33% strangulation),<sup>9</sup> Spain and England/Wales (67%<sup>19</sup> and 31%<sup>23</sup> sharp trauma, respectively) (Table 6).

Most victims were fatally injured in the thorax, while the head, neck and face were less often involved (Table 3). A study on injury patterns of female's homicides in general concluded that the most common locations of wounds were: head and face injured by blunt force, neck injured by strangulation and the thorax by sharp force injuries.<sup>46</sup> Findings from studies on acute patterns of non-fatal IPV show that injuries on the head, neck and face are the most frequent,<sup>37,47</sup> not recognizing the thorax as the leader wounded area (as in our study) which could be explain by the fact that these anatomical regions are preferred targets in fatal assault cases.<sup>48</sup>

Because these types of deaths are particularly violent, in this study we were expecting to detect a higher proportion of cases with multiple fatal wounds (54.8%) rather than with a single wound (45.1%) (Table 3). Instead, another study on female's homicides victims in general concluded that single injuries (58%) – more likely when a gun was used, were more frequent than multiple injuries (42%) – more likely with blunt force.<sup>46</sup>

Our share of victims with additional non-fatal injuries (56.5%), perpetrated just before their deaths, was somewhat slightly lower than the share reported by other foreign studies (65% to over 80%)<sup>12,18,35,49</sup> and it was mainly produced by blunt force, with multiple injuries, and located in the upper limbs. Among all victims, 30.6% of the women presented defense wounds, as in a study on overall homicidal deaths which concluded that 33% of the cases had self-defense injuries on the upper extremities.<sup>50</sup> According to a study on sharp-force homicide, the presence of multiple injuries, located in upper-limbs and the existence of superficial thoracic injuries are more likely when a high inter-relationship between victim and perpetrator exists, and are indicative that the perpetrator had struck several times at the victim and inflicted more injuries than were necessary to kill him/her (overkill), and also, they may represent defense injuries in an attempt from the victim to defend him/herself.<sup>51</sup> Others studies concluded that more than 10 sharp wounds give a statistically significantly higher probability that perpetrator and victim are not stranger to each other<sup>52</sup> and stabbing, beating and strangulation are more intimate forms of violence than shooting.<sup>53</sup>

Toxicological exams were performed in 77.4% of the cases because 1 corpse was found decomposed and the remaining

**Table 6**

Comparison on percentage of homicides involving a firearm and the commonest methods of IPV-related homicides of women.

Country	Homicides involving a firearm (%)	IPV-related homicides of women (%)
USA <sup>18</sup>	60	Gunshot (66) Sharp (16) Blunt (8)
South Africa <sup>11</sup>	45	Blunt force (33) Sharp (33) Gunshot (30)
<b>Portugal (present study)</b>	<b>34</b>	<b>Gunshot (45)</b> <b>Sharp (27)</b> <b>Blunt (15)</b> Gunshot (40) Strangulation (33) Gunshot (23) Sharp (20) Sharp (67) Gunshot (25) Asphyxia (8) Sharp (31)
Canada <sup>44</sup>	32	
Denmark <sup>9</sup>	32	
Spain <sup>19,a</sup>	22	
England and Wales <sup>23</sup>	1	

<sup>a</sup> Data is concerned homicide methods in violence against women (not only in a IPV setting).

victims had a survival time which did not allow these exams. Samples from underneath the fingernails were collected in 72.7% of all the cases for DNA studies and results were positive in 25%, which constituted additional proof about the identity of the perpetrator; in the same sense, a South Africa study concluded that none of the forensic practices increased the likelihood of a conviction in female homicides, except the collection of underneath fingernails samples.<sup>54</sup> In 14.5% of the cases, sexual abuse was suspected, even though none of the victims presented physical sexual injuries, and this could be explained by the fact that sexual practices in intimate context (even with threats or physical force) most of the times do not produce injuries, because victims most often offer no resistance.<sup>55</sup> Literature indicates that 40–50% of alive women suffering from IPV include sexual violence.<sup>55</sup> Nearly 10% of IPV victims suffer genital injury<sup>56</sup> increasing to 13% in victims killed in IPV-related homicides, which may indicate a higher homicide risk for this type of injury.<sup>57</sup> Furthermore, general IPV associated with sexual IPV in particular, both perpetrated by the same men, is generally more severe and more likely to be fatal.<sup>58</sup> A rape homicide was suspected in 16% of all female homicides in South Africa, advising that postmortem sexual examination with collection of specimens should be conducted in all female homicide cases.<sup>59</sup>

#### 4.4. Judicial outcomes

All perpetrators were prosecuted and convicted, except those who died before the final decision (by suicide or other manner of death –  $n = 20$ ) (Fig. 1). This is explained by the fact that one of our inclusion criteria for the selection's cases was the existence of judicial proof of the crime. Otherwise, considering the total of forensic homicide cases, initially selected with suspicion of IPV-related ( $n = 70$ ), in only 62 (88.6%) a proof of homicide in the IPV context was achieved. An earlier study that linked forensic investigation factors, criminal prosecution and convictions, showed that a female homicide conviction was achieved for nearly half of those prosecuted.<sup>54</sup> Convictions are more likely if there was a previous history of IPV, a weapon was found and a crime scene was investigated.<sup>54</sup>

Most perpetrators were convicted of *qualified murder* (59.6%) or *murder* (38.1%), with or without other less serious crimes associated, with an average of prison sentence of 15.5 years. Like in other studies,<sup>23</sup> only a small proportion of the perpetrators who were prosecuted and convicted were submitted to psychiatric examination (33.3%) and were considered non-imputable of the crime and sentenced to security measures (14.3%) (Fig. 1).

#### 4.5. Limitations and outcomes of the study

The present study has some assumed limitations, such as: (a) the sample represents a safe number of confirmed cases, but surely underestimated, because some few cases were probably not been autopsied and in others it was not possible to prove the crime in trial; (b) missing data, especially concerning the perpetrators and history of previous IPV, mainly because we were dependent on available data from a retrospective study; (c) impossibility to confirm and measure risk factors because we did not have any control population comparison.

This study highlights that one of the weakest points in the management of fatal IPV cases in Portugal is the reduced multi-disciplinary articulation of all involved entities, so an important step to be taken should be improving effective networking. Furthermore, more attention should be given to high risk situations of fatal IPV, particularly during or after relationship breakdowns. Overall numbers on this topic are fragmented, thus we recommend the creation of a national homicide database, gathering information

from different sources, like it happens in other countries.<sup>6,20,23,24</sup> This work also emphasizes the importance of adopting standard broader IPV definitions, which will allow accurate data comparability and less underestimated prevalence of the phenomena. Increased understanding of IPV against women, including prevalence and mortality rates, is dependent on improved data and trend information which is fundamental for raising awareness, developing prevention programs, formulating evidence-based policies and monitoring changes.

## 5. Conclusions

This is the first nationwide study concerning clinical, forensic and criminology characteristics of intimate partner homicide among the Portuguese adult population; and it may be considered a portrait of the current national situation, with data as recent as possible. The adopted methodology – selection through the forensic system and confirmed by judicial outcomes – may be considered one of the most reliable methods to assess fatal IPV cases in the present Portuguese context.

During the 3-year period, considering all alleged IPV-related homicides based on the autopsy conclusions ( $n = 70$ ), in only 62 (89%) a proof of homicide in the IPV context was achieved; corresponding to a mortality rate of 0.44/100.000 women aged 15 years or older, per year. Female intimate partner homicide victims constitutes an important part of forensic autopsies' case load (13%), representing the most common type of women homicide (61%), as expected in a low intentional homicide rate country.

The typical victim is a young adult woman (20–40 years old), not employed (39%), killed by a current husband in a long-term relationship (62%), usually with children in common (53%) and presenting a frequent history of previous IPV (47%). The typical perpetrator is a man 5.5 years older than the victim, employed (34% at least), with a history of substance abuse and psychiatric problems (at least, in 18% and 16% respectively), usually owning a firearm (95% of the known cases) and without known criminal records (70%).

Intimate partner homicide is more frequent in marital (61%) and current relationships (60%), evolving cohabitation (50%) and during the first year after the relationship terminus (60% of the former relationships). Most fatal events took place in homes shared by the victim and perpetrator (40%), and were allegedly triggered mostly by concrete or threat of separation (39%), or by jealousy (32%). Almost half of the perpetrators attempted (23%) or committed (24%) suicide after the homicide; other multiple victims occur as 2 attempted and 6 consummated homicides; 21% of the fatal incidents occurred in the presence of minors.

Most women were killed by gunshot wounds (45%) typically with shotguns and rifles (60.1%) – contrarily to other IPV homicides of women in European countries (involving other fatal methods apart from firearms use) and oppositely to general homicides in Portugal (where handguns are the weapon most used) – especially in the thorax (49%), with multiple fatal injuries (55%); in 57% they presented non-fatal IPV injuries (defense wounds in 73%) especially due to blunt trauma (63%); sexual offenses were suspected in 15% of the cases but physical sexual examination and DNA analysis were negative. In 73% of all the cases, samples were collected underneath the fingernails of the victims, with 25% positive results. Only some victims presented positive blood alcohol concentration for alcohol (17%) and for illegal drugs (7%).

Perpetrators who did not die before the final decision were all convicted, mainly of *qualified murder* (59.6%) or *murder* (38.1%).

Our analysis and also literature suggest that the following aspects should have a positive impact in decreasing and preventing IPV fatal outcomes: (a) attempting to identify timely high-risk IPV



situations (risk assessment) allowing DV protective measures to be timely implemented, in order to avoid or reduce fatal outcomes; (b) giving adequate support to victims who present denouncement of IPV; (c) improving the intervention of mental health care services in this issue and preventing alcohol and other substance abuse; (d) improvement in controlling and prohibiting access to firearms for perpetrators; (e) promoting the recognition and assessment of this form of violence amongst criminal investigators and forensic technicians, including the improvement of DNA collection, which could be critical for the fair judicial progress of these cases.

This work also emphasizes the need to deepen the research on this issue, adopting standard comparable concepts, doing systematically homicide reviews and creating a national IPV homicide database, in order to formulate better evidence-based policy responses but, particularly, for prevention purposes on both fatal and non-fatal IPV.

#### Ethical approval

It was ensured that personal information concerning victims and perpetrators was protected, confidential and anonym in accordance with ethical rules. Ethical approval for the study was granted by the *Ethics Committee of the Faculty of Medicine of the University of Coimbra*.

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#### Conflict of interest

None.

#### References

1. WHO multi-country study on women's health and domestic violence against women: initial results on prevalence, health outcomes and women's responses. World Health Organization; 2005.
2. Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. *Lancet* 2002 Oct 5; **360**(9339):1083–8.
3. III National plan against domestic violence 2007–2010. Comissão para a Cidadania e Igualdade de Género; 2007.
4. Global study on homicide – trends, contexts, data. United Nations Office on Drugs and Crime; 2011.
5. Dawson M. Examination of declining intimate partner homicide rates: a literature review. Department of Justice Canada Research and Statistics Division; 2001.
6. Mahony TH. Homicide in Canada 2010. Statistics Canada; 2011 catalogue no. 85-002-x.
7. Barraclough B, Harris EC. Suicide preceded by murder: the epidemiology of homicide-suicide in England and Wales 1988–92. *Psychol Med* 2002 May; **32**(4):577–84.
8. Merzagora I, Travaini G, Battistini A, Pleuteri L. Murder-suicide in the province of Milan, Italy: criminological analysis of cases 1990–2009. *Med Sci Law* 2011 Apr; **51**(2):87–92.
9. Leth PM. Intimate partner homicide. *Forensic Sci Med Pathol* 2009; **5**(3):199–203.
10. Legislation in the member states of the council of Europe in the field of violence against women Moldova to United-Kingdom, vol. II. Council of Europe Directorate General of Human Rights and Legal Affairs; 2009.
11. Abrahams N, Jewkes R, Martin LJ, Mathews S, Vetter L, Lombard C. Mortality of women from intimate partner violence in South Africa: a national epidemiological study. *Violence Vict* 2009; **24**(4):546–56.
12. Campbell JC, Webster D, Koziol-McLain J, Block C, Campbell D, Curry MA, et al. Risk factors for femicide in abusive relationships: results from a multisite case control study. *Am J Public Health* 2003 Jul; **93**(7):1089–97.
13. Grams AC, Magalhães T. Violência nas relações de intimidade. Avaliação do risco [Intimate partner violence. Risk assessment]. *Revista Portuguesa Do Dano Corporal* 2011; **22**:75–98.
14. Strengthening understanding of femicide – using research to galvanize action and accountability. World Health Organization; 2008.
15. Mathews S, Abrahams N, Jewkes R, Martin LJ, Lombard C, Vetter L. Intimate femicide-suicide in South Africa: a cross-sectional study. *Bull World Health Organ* 2008 Jul; **86**(7):552–8.
16. Saint-Martin P, Bouyssy M, O'Byrne P. Homicide-suicide in Tours, France (2000–2005)—description of 10 cases and a review of the literature. *J Forensic Leg Med* 2008 Feb; **15**(2):104–9.
17. Abrahams N, Jewkes R, Mathews S. Guns and gender-based violence in South Africa. *South Afr Med Journal = Suid-afrikaanse tydskrif vir geneeskunde* 2010 Sep; **100**(9):586–8.
18. Moracco KE, Runyan CW, Butts JD. Female intimate partner homicide: a population-based study. *J Am Med Womens Assoc* 2003; **58**(1):20–5. Winter.
19. Lucena J, García CA, Santos M, Rico A, Blanco M, Giménez MP, et al. Estudio médico-legal del homicidio en la provincia de Sevilla (2004–2007). Especial referencia a los homicidios de mujeres en el contexto de violencia de género [Medico-legal study of the homicide in the province of Seville (2004–07). Special reference to the female victims inside the gender violence]. *Cuadernos de Medicina Forense* 2008; **14**(51):35–46.
20. Cooper A, Smith EL. Homicide trends in the United States, 1980–2008, annual rates for 2009 and 2010 (Bureau of Justice Statistics – Patterns and Trends) NCJ 236018. U.S. Department of Justice – Office of Justice Programs; 2011.
21. Rennison C. Intimate partner violence, 1993–2001 (Bureau of justice statistics – crime data brief) NCJ 197838. U.S. Department of Justice – Office of Justice Programs; 2003.
22. Brookman F, Maguire M. Reducing homicide: a review of the possibilities (Home office online report 01/03). Home Office; 2003.
23. Smith K, Coleman K, Eder S, Hall P. Homicides, firearm offences and intimate violence 2009/10. Home Office Statistical Bulletin; supplementary volume 2 to crime in England and Wales 2009/10. 2nd ed.; 2011.
24. Homicide statistics. Australian Institute of Criminology; 2007.
25. Breitman N, Shackelford TK, Block CR. Couple age discrepancy and risk of intimate partner homicide. *Violence Vict* 2004 Jun; **19**(3):321–42.
26. Raj A, Silverman JG. Immigrant South Asian women at greater risk for injury from intimate partner violence. *Am J Public Health* 2003 Mar; **93**(3):435–7.
27. Caetano R, McGrath C, Ramisetty-Mikler S, Field CA. Drinking, alcohol problems and the five-year recurrence and incidence of male to female and female to male partner violence. *Alcohol Clin Exp Res* 2005 Jan; **29**(1):98–106.
28. Block CR. The Chicago Women's Health Risk Study – risk of serious injury or death in intimate violence – a collaborative research project. Chicago: Illinois Criminal Justice Information Authority; 2000.
29. Lipsky S, Caetano R, Field CA, Bazargan S. The role of alcohol use and depression in intimate partner violence among black and hispanic patients in an urban emergency department. *Am J Drug Alcohol Abuse* 2005; **31**(2):225–42.
30. Sharps PW, Campbell J, Campbell D, Gary F, Webster D. The role of alcohol use in intimate partner femicide. *Am J Addictions/American Acad Psychiatrists Alcohol Addict* 2001; **10**(2):122–35. Spring.
31. Lipsky S, Caetano R, Field CA, Larkin GL. Psychosocial and substance-use risk factors for intimate partner violence. *Drug Alcohol Depend* 2005 Apr 4; **78**(1):39–47.
32. Barry RA, Bunde M, Brock RL, Lawrence E. Validity and utility of a multidimensional model of received support in intimate relationships. *J Fam Psychol* 2009 Feb; **23**(1):48–57.
33. Arbuckle J, Olson L, Howard M, Brillman J, Anctil C, Sklar D. Safe at home? Domestic violence and other homicides among women in New Mexico. *Ann Emerg Med* 1996 Feb; **27**(2):210–5.
34. Domestic-related homicide: keynote papers from the 2008 international conference on homicide. Australian Institute of Criminology; 2009.
35. Aldridge ML, Browne KD. Perpetrators of spousal homicide: a review. *Trauma Violence Abuse* 2003 Jul; **4**(3):265–76.
36. Koenig MA, Stephenson R, Ahmed S, Jejeebhoy SJ, Campbell J. Individual and contextual determinants of domestic violence in North India. *Am J Public Health* 2006 Jan; **96**(1):132–8.
37. Sheridan DJ, Nash KR. Acute injury patterns of intimate partner violence victims. *Trauma Violence Abuse* 2007 Jul; **8**(3):281–9.
38. Sisti D, Rocchi MBL, Preti A. The epidemiology of homicide in Italy by season, day of the week and time of day. *Med Sci Law* 2012 Apr; **52**(2):100–6.
39. Rock D, Greenberg DM, Hallmayer J. Cyclical changes of homicide rates: a reanalysis of Brearley's 1932 data. *J Interpers Violence* 2003 Aug; **18**(8):942–55.
40. Wallace A. Homicide: the social reality. 1986; Sydney: Australia. In: Aldridge ML, Browne KD, editors. Perpetrators of spousal homicide: a review. *Trauma violence abuse*, **4**(3); 2003. p. 265–76.
41. Stout KD. Intimate femicide: a study of men who have killed their mates. *J Offender Rehabil* 1993; **19**:81–94 [eng].
42. Wilson M, Daly M. Till death do us part. In: Russell JRD, editor. *Femicide: the politics of women killing*. Buckingham: UK: Oxford University Press; 1992a. p. 83–98.
43. Dias R. Homicídios no Norte de Portugal: Estudo médico-legal [Homicides in the north of Portugal: Medico-legal study] [Master thesis]. Porto: Universidade do Porto; 2012.
44. Pinet JM. The hunter in Europe. Institut National Agronomique Paris-Grignon; 1995.
45. Fedorowycz O. catalogue no. 85-002-XIE. In: *Homicide in Canada 2000*, vol. 21. Statistics Canada; 2001 no. 9.
46. Mathews S, Abrahams N, Jewkes R, Martin LJ, Lombard C, Vetter L. Injury patterns of female homicide victims in South Africa. *J Trauma* 2009 Jul; **67**(1):168–72.
47. Biroscak BJ, Smith PK, Post LA. A practical approach to public health surveillance of violent deaths related to intimate partner relationships. *Public Health Rep* 2006 Jul-Aug; **121**(4):393–9.



48. Knight B. *The pathology of wounds. Simpson's forensic medicine*. Great Britain: Edward Arnold; 1991. p. 1–2.
49. McFarlane J, Campbell JC, Watson K. Intimate partner stalking and femicide: urgent implications for women's safety. *Behav Sci Law* 2002;**20**(1–2):51–68.
50. Mohanty MK, Panigrahi MK, Mohanty S, Dash JK, Dash SK. Self-defense injuries in homicidal deaths. *J Forensic Leg Med* 2007 May;**14**(4):213–5.
51. Karlsson T. Multivariate analysis ('forensiometrics')—a new tool in forensic medicine. Findings on the victim of sharp-force homicide can predict the inter-relationship with the perpetrator. *Forensic Sci Int* 1999 Apr 12;**101**(1):33–41.
52. Karlson TA. Sharp force homicide in the Stockholm area, 1983–1992. *Forensic Sci Int* 1998;**94**:129–39.
53. Silverman RA, Mukherjee SK. Intimate homicide: an analysis of violent social relationships. *Behav Sci Law* 1987 Winter 5(1):37–47. In: Aldridge ML, Browne KD, editors. *Perpetrators of spousal homicide: a review. Trauma violence abuse*, **4**(3); 2003 Jul. p. 265–76.
54. Abrahams N, Jewkes R, Martin LJ, Mathews S. Forensic medicine in South Africa: associations between medical practice and legal case progression and outcomes in female murders. *PloS One* 2011;**6**(12):e28620.
55. Martin EK, Taft CT, Resick PA. A review of marital rape. *Agression Violent Behav* 2007;**12**:329–47.
56. Amar AF, Gennaro S. Dating violence in college women: associated physical injury, healthcare usage, and mental health symptoms. *Nurs Res* 2005 Jul-Aug;**54**(4):235–42.
57. Wadman MC, Muelleman RL. Domestic violence homicides: ED use before victimization. *Am J Emerg Med* 1999 Nov;**17**(7):689–91.
58. Campbell JC, Soeken KL. Forced sex and intimate partner violence: effects on women's risk and women's health. *Violence Against Women* 1999;**5**:1017–35.
59. Abrahams N, Martin LJ, Jewkes R, Mathews S, Vetten L, Lombard C. The epidemiology and the pathology of suspected rape homicide in South Africa. *Forensic Sci Int* 2008 Jul 4;**178**(2–3):132–8.